



14. NATURAL RESOURCES MANAGEMENT

This chapter includes those management practices that directly affect soil, water, vegetation, and fauna. It includes forest management, fish and wildlife habitat and population management, and land management. Other programs include management for wetland protection, water quality, pests, and urban-related wildlife.

14-1 Objectives

Military Readiness

- ▶ Ensure no net loss in the capability of installation lands to support existing and projected military missions on Fort Greely.
- ▶ Restore damaged training areas and provide improved troop training environments to sustain training indefinitely.
- ▶ Maintain forested lands in conditions needed to support the military mission.

Stewardship

- ▶ Use ecosystem management philosophies to protect, conserve, and enhance native fauna and flora with an emphasis on biodiversity enhancement.
- ▶ Provide economic and other human-valued products of renewable natural resources when such products can be produced in a sustainable fashion without significant negative impacts on the military training mission.
- ▶ Enhance and maintain the forest to support the Fort Greely military mission. Whenever feasible, use commercial means for removing tim-

ber to support military construction projects or training operations.

- ▶ Ensure that Fort Greely's natural resources program is coordinated with other agencies and conservation organizations with similar interests.
- ▶ Use forest management to protect the forest ecosystem from significant losses due to insects, disease, and/or fire.
- ▶ Investigate options to commercially harvest sawtimber, poletimber, and/or pulpwood on Fort Greely.
- ▶ Protect and conserve all biological communities, including game and non-game species.
- ▶ Protect soil integrity and enhance soil productivity.
- ▶ Manage the forest ecosystem at Fort Greely to enhance ecosystem integrity and produce forest products on a sustainable basis.
- ▶ Protect soil integrity and enhance soil productivity.
- ▶ Improve the quality of habitat for game and non-game species.
- ▶ Use artificial nesting structures to improve productivity for wildlife species.
- ▶ Produce game on a sustainable basis to support hunting, trapping, and fishing programs.
- ▶ Control noxious plants and pest animals in a manner that supports the military mission, promotes sustained ecosystem functionality, favors native species, and adds to the quality of life of the Fort Greely and surrounding communities.

Quality of Life

- ▶ Manage game species within biological and recreational carrying capacities of the resources.
- ▶ Maintain an aesthetically pleasing cantonment area landscape that maintains natural ecosystem functions as much as possible.
- ▶ Support quality of life programs through the sale of personal-use Christmas trees and firewood.

Compliance

- ▶ Manage natural resources within the spirit and letter of environmental laws, particularly the Sikes Act upon which this INRMP is predicated.
- ▶ Protect, restore, and manage sensitive species and wetlands.
- ▶ Use procedures within the National Environmental Policy Act (NEPA) to make informed decisions that include natural resources considerations and mitigation.
- ▶ Implement this INRMP within the framework of Army policies and regulations.
- ▶ Protect water quality and its associated values on Fort Greely watersheds and on watersheds that drain from the installation.
- ▶ Manage wetlands to ensure "no net loss."

Integration

- ▶ Ensure the integration of, and consistency among, various activities identified within this INRMP.
- ▶ Ensure that natural resources management is consistent with principles of Integrated Pest Management at Fort Greely.
- ▶ Coordinate implementation of natural resources management with the overall Fort Greely environmental program.
- ▶ Coordinate implementation of this INRMP with military training organizations.

14-2 Forest Management

Forest management is required to protect, maintain, and enhance military training environments. Tree density, ground cover, and other factors within the forest ecosystem are critical to the accomplishment of the military mission. In addition, management of the forest ecosystem is important to maintain biodiversity, wildlife habitat management, and the development of outdoor recreation. The objectives of the forest management program at Fort Greely during 1998 to 2002 are to inventory the forest resources (Section 12-2e), conduct a commercial forestry feasibility study (Section 14-2b), create a for-

est ecosystem management plan (Section 14-2a), and manage the forest and vegetative resources in support of the military mission and ecosystem management principles (Section 14-2c).

Under Public Law 99-606, BLM retains vegetative and mineral rights for East and West Training Areas. Any vegetation manipulation by USARAK must be approved by BLM. BLM timber management practices, contract stipulations, and the mandates of the State's forest practices regulations would govern the sale of timber from these lands.

14-2a Forest Management Plan

Project Description. Prepare, update and implement a forest management plan for Fort Greely.

Project Justification. The management of forest and woodland resources is consistent with ecosystem management principles and is required by the Sikes Act and AR 200-3. The *Fort Greely Resource Management Plan* (BLM and U.S. Army, 1994) requires the development of a forest management plan that is compatible with achieving the military mission.

Project Prescription. The forest management plan will consider public safety, preservation of habitat, and recreation. Harvests of timber products from Fort Greely are permitted, but not mandatory.

Commercial forest harvest has not been significant on Fort Greely. Management of the forest ecosystem is one of the most critical aspects of land management on the installation due to the high percentage of forested land and its importance to wildlife. The plan would maintain and enhance the health, productivity and biological diversity of forest and woodland ecosystems. Forest diversity maintains a varied military training environment.

14-2b Conduct Commercial Forest Management Feasibility Study

Project Description. Conduct a feasibility study to determine if there is a market to support commercial forestry on Fort Greely.

Project Justification. There has been some public interest in the timber resource. BLM controls the timber rights on USARAK withdrawn lands under Public Law 99-606 and PLO 2676. The Army would like to evaluate the potential for commercial forest

management to implement ecosystem management, habitat enhancement, and reduce military training support costs. AR 200-3 requires forest management.

Project Prescription. The project will be completed by 2001. It will be closely tied to the development of a forest ecosystem management plan (Section 14-2a) for Fort Greely. It will use information from the *Forest Resources of Bureau of Land Management and Military Lands Within a 100 Mile Radius of Fairbanks, Alaska* (Tanana Chiefs Conference, 1993) and more specific information from completed portions of the Fort Greely forest inventory (described in Section 12-2e). The study will emphasize market availability, implications of laws and agency regulations, agency responsibilities, and cost and benefit analysis.

14-2c Forest Ecosystem Management

Project Description. Conduct forest ecosystem management on Fort Greely to support military training requirements and ecosystem management objectives. Forest ecosystem management does not just involve commodity production; protection of sensitive habitats and needs of the military for cover and concealment are primary objectives. Timber, fuelwood, or Christmas tree sales may be used to accomplish military or ecosystem objectives. Timber stand improvement may also be utilized as a tool to accomplish habitat improvement or to improve the commercial value of forest tree species.

Project Justification. Forest ecosystem management is necessary to support military training by reducing forest density and implementing habitat management. Ecosystem management will support increased biodiversity. The Sikes Act and AR 200-3 require forest management.

Project Prescription. Fort Greely's forestry program has emphasized the sale of Christmas trees and firewood as well as urban landscaping on Main Post. Future management of the forest ecosystem on Fort Greely will be geared toward supporting the military mission, protecting ecosystem functionality, sustainable production of forest products, and providing quality recreational opportunities.

This project will be completed in cooperation with BLM, which holds timber rights under Public Law

99-606. Forests on withdrawals fall under BLM's restricted category for management; that is, management of the withdrawal is primarily for the military, but timber harvests are permitted. Members of the public may approach BLM for a permit to purchase timber on withdrawn lands, but each timber sale must be approved by the military.

It is important to maintain a wide variety of ages and species, protect and develop old growth, protect watersheds, and protect options for future management. Meeting military mission requirements will remain the primary objective of forest management during 1998-2002. This project will be influenced by development of the forest ecosystem management plan (Section 14-2a), commercial management feasibility study (Section 14-2b), and the forest ecosystem inventory (Section 12-2e).

Timber removal and other forest management practices will be coordinated with Range Control to ensure minimal disruption of military training. Scheduling usually will be done three to six months in advance of activities. Appropriate NEPA documentation will be completed prior to implementation of timber stand improvement projects.

14-2c(1) Conduct Timber Removal for Military Mission Support

Description. USARAK will remove or thin up to 100 acres of trees or shrubs per year during 1998 - 2002 to support military training activities. The military needs to train personnel under certain environmental conditions. This may require the removal of trees to create open areas for drop zones, small arms firing ranges, or construction. Thinning stands of trees to allow maneuverability in certain areas may also be necessary.

Methods. USARAK natural resources personnel have two choices when there is a need to clear or thin timber with commercial value on withdrawn lands. They can request support from BLM to conduct a timber sale, or they can remove the trees without selling them (by cutting or burning) upon approval from BLM and after NEPA analysis. Troops are permitted to harvest forest products to achieve training objectives. Trees less than four inches dbh may be cut without prior approval. Removal of larger trees on approved sites requires Natural Resources

Branch coordination. Stumps must be less than six inches high. (U.S. Army, Alaska, 1994). During 1998-2002, the Army will use the best options available to remove or thin timber to support military training.

14-2c(2) Timber Stand Improvement

Description. Conduct Timber Stand Improvement (TSI) on Fort Greely to improve the quality of forest to support military training activities and improve wildlife habitat. TSI is designed to improve species composition, quality, and/or growth rate of existing stands by removing competing vegetation to allow preferred trees to grow at faster rates.

Methods. TSI is often categorized as noncommercial activities used to improve the quality of commercial timber, but it may also be used to improve forest conditions for other uses. TSI may include thinning, chemical injection, prescribed burning, etc., all of which are designed to improve species composition, quality, and/or growth rate of existing stands by removing competing vegetation to allow preferred trees to grow faster. The only TSI that will occur within the Fort Wainwright forest ecosystem is forest management used to improve conditions for military training (thinning might be an example) or to improve wildlife habitat (prescribed burning, forest clearings, etc.). Wildlife habitat enhancements are described in Section 14-3a.

14-2c(3) Forest Regeneration

Description. Regenerate forests following loss of trees. Regeneration of forests either naturally or planned, is an essential part of forest ecosystem development. Decisions to guide future forest development through planned regeneration or by allowing natural conditions and processes to prevail need to be made.

Methods. USARAK has no plans to artificially regenerate the forest ecosystem on Fort Greely. Natural regeneration will be relied upon following harvest. If commercial harvest becomes significant, USARAK will investigate the cost/benefits of planting to other forms of regeneration. In the past, ADNRR preferred to manage for seed regeneration in even-aged stands, keeping all cut areas within 500 feet of seed trees. However, the agency was experiencing

problems with this more natural regeneration, with planting often being required. Current methods of using uneven-aged management of mixed forests results in much better natural regeneration of white spruce, a preferred species.

14-2c(4) Timber Management

Description. Conduct timber management on Fort Greely. USARAK is not in a position to plan a long-term commercial forest management program for withdrawn lands. However, USARAK should continue to pursue the potential for collaborating with the BLM to develop commercial forest management programs on withdrawn lands during 1998-2002, as part of its commitment towards ecosystem management.

Methods. Management of white spruce should be conducted on a 120-year rotation, and aspen saw timber should be conducted on a 60-year rotation. Black spruce is not suitable for commercial management. Timber should be harvested using selective harvest (taking out certain diameters on a given cut) and improving species composition at the same time using species-specific harvest. The preferred method is to cut older white spruce first (about 25 trees per acre to a 70-80% BA) as well as culls and undesirables, leaving aspen, cottonwood, and birch. This resulting mixed forest grows better than white spruce monocultures. Selective cutting also reduces *Calamagrostis* infestation of cut sites.

Sections 12-2e and 14-2 describe proposals for a forest inventory and forest management plan. It is envisioned that the next INRMP (2002-2006) will include a more definitive timber management program.

14-2c(5) Timber Sales

Description. Be prepared to conduct timber sales during 1998-2002. The removal and/or thinning of timber on portions of Fort Greely could improve conditions for conduct of the military mission and enhance the local economy. Even though USARAK has no plans for commercial harvest of timber, such opportunities may become viable during the next five years, and there may be requirements to remove timber with commercial value to support the military mission. Thus, USARAK must be prepared to use timber sales as a land management tool, if

needed.

Methods. The *Fort Greely Resource Management Plan* (BLM and U.S. Army, 1994) requires that timber sales on Fort Greely be governed by common BLM timber management practices, contract stipulations, and the mandates of the state's forest practices regulations. Common requirements include:

- ▶ Construction, improvement, and maintenance of safe and environmentally-sound road systems
- ▶ Felling and yarding of timber in such a way as to protect soil and water quality, residual trees, and human safety
- ▶ Treatment of logged sites to prepare them for the next generation of trees
- ▶ Disposal of logging slash for silvicultural and/or fire hazard reduction purposes
- ▶ Mitigation measures for protecting wildlife habitat
- ▶ Other miscellaneous provisions, where appropriate, such as meeting minimum fire requirements and application of disease control measures

Harvest plans would be prepared prior to commercial sales of forest products. Plans would include sale boundaries, cruised volume, silvicultural prescription, road layout, best management practices for prevention of soil erosion and sedimentation, water quality considerations, cultural resources protection, wildlife considerations, harvest method(s), scaling requirements, slash disposal, site preparation, and regeneration requirements. A USARAK wildlife biologist would assist with plans for timber sales to ensure consideration of wildlife habitat values. Documentation for compliance with NEPA as well as required cultural resources surveys would be completed prior to sales.

14-2c(6) Forest Disease/Insect Prevention

Description. Minimize forest disease/insect damage. The spruce bark beetle (*Dendroctonus rufipennis* (Kirby)) is becoming more significant on Fort Greely in terms of its effects on the forest ecosystem. ADNRR estimates that 30%-50% of forest stands older than 150 years are infected in the Fort

Greely area. One result of spruce bark beetle outbreaks is increased fire danger. Standing dead timber generally falls within 10 years, creating up to 40 tons of fuel per acre on the ground.

Methods. The best prevention tactic to reduce spruce bark beetle damage is managing for a diversity of species and age classes within the forest. The combination of mature spruce and a reduction in natural disturbance is ideal for the spruce bark beetle and associated changes in the forest ecosystem. (Dr. Edward Holsten, personal communication). Thus, TSI and prescribed burning (sections 14-2c(2) and 13-3c, respectively) would reduce susceptibility to the spruce bark beetle.

The spruce budworm (*Choristoneura* sp.), an insect that defoliates trees, could be a serious pest species with regard to forest ecosystems in interior Alaska. The ADNRP (Peter Buenau and Stephen Claudice, personal communication) estimates that 20,000 acres of young and old trees west of Fairbanks are infested. According to Holsten et al. (1985), the Fairbanks area is the furthest north this insect has been found in Alaska. These outbreaks have been very limited and cause relatively little damage. Large-scale control is neither needed nor feasible. This pest is not a significant problem on Fort Greely.

A species of engraver beetle (*Ips* sp.) is found throughout Alaska, but it is most prevalent in the Interior. *Ips* favors sites with accumulation of slash, which has not been a factor on Fort Greely. *Ips* outbreaks usually develop and disappear rapidly, precluding the need for direct control operations (Holsten et al., 1985).

There are no other important forest insects or diseases known on Fort Greely. Holsten et al. (1985) describes important insects and diseases that affect forests in Alaska.

14-3 Fish and Wildlife Management

Fish and wildlife management on Fort Greely is built upon a tradition of game management to support hunting, trapping, and fishing. In the early 1980s this base broadened, driven by a growing recognition of the importance of nongame species in ecosystem functions. More recently, emphasis has been

on general fauna and flora inventory. Data needed to build a nongame program as part of managing ecosystems has been or is being collected. Data collection will continue as part of program expansion. It will be a challenge to develop and implement management programs for nongame species and their habitats, during a period of declining budgets and personnel while maintaining high quality game management aspects of the Fort Greely ecosystem.

14-3a Habitat Management Plan

Project Description. Prepare, update, and implement a habitat management plan for Fort Greely.

Project Justification. The habitat management plan will maintain a diverse training environment, enhance recreational opportunities, and comply with the Sikes Act, Migratory Bird Treaty Act, Executive Order 12962, Recreational Fishery Resources Conservation Plan, Endangered Species Act, and AR 200-3.

Project Prescription. The plan will describe projects to improve biodiversity and moose, bear, Dall sheep, raptor, fisheries, upland game bird, and migratory bird habitat. This plan will be completed by 1999.

14-3b Habitat Management

Description. Conduct habitat management on Fort Greely during 1998-2002.

Justification. Habitat management is required by Public Law 86-797 (Sikes Act), AR 200-3, and the Cooperative Agreement for Management of Fish and Wildlife Resources on Army Lands in Alaska. USARAK and BLM are responsible for habitat management on the East and West Training Areas. The quality of wildlife habitat, especially for moose, has declined over the past ten years. The development and improvement of habitat each year will maintain habitat for moose, brown and black bear, wolf, wolverine, lynx, coyote, fox and other smaller mammals and birds, including bald eagles, owls, hawks, and a variety of waterfowl and passerines currently inhabiting the installation.

Prescription. Conduct habitat management on up to 200 acres per year on Fort Greely during 1998 – 2002.

14-3b(1) Conduct Moose Habitat Management

Description. Improve moose habitat on up to 100 acres per year. The moose is an important game species on Fort Greely. Due to protection from fires and a lack of commercial forestry, the quality of moose foraging habitat (lower successional stages of willow) has declined over the years. The Sikes Act strongly emphasizes management for game species, and improvement of moose habitat is an important component of compliance with this requirement.

Methods. Moose habitat improvement will include creating clearings and conducting prescribed burning on selected areas of Fort Greely. Clearings will be created using the following prescription:

- ▶ Lands chosen for moose habitat improvements should already have a component of willow.
- ▶ Smaller treatment areas, in particular, should be round or square. Configured areas should be at least 10 acres, and these areas may be as large as 40 acres (or even larger in some cases).
- ▶ A 25-year rotation is the target for moose habitat treatment.
- ▶ Cutting should be conducted in the winter or early spring, before plant food reserves are in the upper plant.

Prescribed burning is discussed in Section 13-3c. USARAK will use AFS to assist with prescribed burns. As discussed in Section 13-3c(3), prescribed burning might be required to help promote preferred species over *Calamagrostis* during initial revegetation of cutover sites.

Removal of trees for forest management, personal use, or military purposes can also improve wildlife habitat in some cases. These treatments include salvage operations, construction and right-of-way clearing, and firewood or Christmas tree removal. Since these costs would be incurred anyway, the additional cost for moose habitat improvement is minimal. For example, if firewood cutting removes trees greater than four inches in diameter, it is less expensive to use the hydro-axe to complete a moose habitat improvement project.

14-3b(2) Artificial Nests

Description. Improve nesting habitat for birds by building nest boxes. Nest boxes will improve nesting and breeding success for several species of birds (ducks, owls, raptors, etc.). Building nest boxes can be an activity for organizations in the community that wish to get involved in wildlife habitat improvement.

Methods. Fort Greely does not currently have a program for installing nesting structures. Building and erecting nest boxes are good volunteer projects for scouts and other organizations that want to become involved with wildlife habitat enhancement.

14-3b(3) Fish Habitat Improvement

Description. Improve fish habitat by reducing oxygen depletion in the winter. On rare occasions when snow is not removed from frozen lakes by wind, the risk of oxygen depletion under the ice is high. USARAK has used heavy equipment to remove snow from lakes during winter (Anonymous, 1979), but this is needed only occasionally.

Methods. This practice will be continued as needed during the next five years. Big Lake could support an excellent fishery if the water level was raised. The lake is now about 10 feet deep, thus it freezes solid in winter and prevents fish from overwintering in this otherwise productive lake. ADF&G has recommended that during 1998-2002, USARAK should evaluate the costs and benefits of raising the lakes level an additional 15 feet. The project would probably require the use of combat engineers who could complete it as a training project, and therefore would be more cost effective.

14-3b(4) Prescribed Burning for Multiple Species Habitat Management

Description. Conduct prescribed burns to improve wildlife habitat. Section 13-3c includes a justification for prescribed burning for wildlife habitat enhancement. The Sikes Act requires USARAK and BLM to manage wildlife habitat. Prescribed burning is one of the most effective and efficient means to enhance wildlife habitat on Fort Greely.

Methods. Much of the eastern portion of Fort Greely has burned from either natural causes or incendiary devices, thus enhancing moose habitat. Other burned areas have had mixed results with regard to the movement of bison onto them. Berger (1996) recommended the development of a “let-burn” policy for bison habitat management on tracts of land between the Gerstle and Panoramic Fields of the Delta Junction Bison Range, westward to mid- and upper Jarvis Creek and the Delta River, and on the western side of the Delta River to the Little Delta River.

Prescribed burning is beneficial to ecosystem maintenance on much of Fort Greely because fire is an important component of the ecosystem’s development. The 250,000-acre Blair Lakes burn in 1980, which burned the Tanana Flats Training Area on Fort Wainwright, produced conditions much like burns on the West Training Area. A five-year study by ADF&G (Simpson and Shields, 1995) on four sites within the Tanana Flats Training Area burn found the following.

- ▶ Moose moved into and heavily browsed a lightly burned study area, which revegetated with prolific willow sprouting.
- ▶ Moose moved into and heavily browsed prolific growth of aspen sprouts and suckers in an intensively burned study area.
- ▶ Two study areas dominated by black spruce that were burned heavily showed little regrowth of preferred browse species, and moose use was low.
- ▶ There was little evidence of snowshoe hares in all but the lightly burned study area.
- ▶ By 1985, tree seedling, tall shrub, low shrub, and moss cover had increased in all four study areas.
- ▶ Increases in herbaceous cover occurred in three of the four areas.

ADF&G uses prescribed burning for habitat restoration (reducing the amount of black spruce) on state lands west of Wood River. The burning is prescribed by the *Western Tanana Flats Prescribed Burning Plan* (State of Alaska, 1995). This plan has three goals and three objectives.

Goals

- ▶ Restore age diversity among aging vegetative types, thus maintaining or enhancing wildlife habitat values for species needing early- to mid-successional stages.
- ▶ Maintain or enhance wildlife-related recreation opportunities in an area close to human population centers in the Alaska’s interior.
- ▶ Reduce the risk of unmanageable, expensive, and potentially dangerous wildfires that could threaten adjacent communities and protected timber resources.

Objectives

- ▶ Burn 50%-70% of each core area. (Note: There are three core areas.)
- ▶ Kill at least 50% of black spruce in the final burned area with a burn of varying intensities to allow shrub understory component to proliferate by sprouting.
- ▶ Kill at least 50% of the aboveground stems of birch, aspen, poplar, and willow in the final burned area to promote root or basal sprouting.

The Western Tanana Flats burning plan includes discussions of preburn considerations, public notice of planned burns, burning prescriptions, ignition methods, smoke management, holding plan, contingency plan for fire escape, communications and coordination, and monitoring and evaluation. The plan could be used as the basis for a Fort Greely prescribed burning plan.

The prescribed burning “window” in springtime is narrow; it occurs between the loss of snow cover and green-up, usually during late May. Often, the period is very wet, which makes burning difficult. Fall burning is also possible, because often conditions are better for burning before snowfall. An air quality permit from the Alaska Department of Environmental Conservation is required for burning as well as NEPA documentation.

Prescribed burning is favored by BLM. It is less complicated and a more natural means of vegetation removal, than using timber harvest or other mechanical means. Fort Greely personnel will experi-

ment with prescribed burning during 1998-2002. Burn plans will be developed by AFS for implementing individual burns. Fire history and ecology information currently available at AFS will help determine for which specific parcels prescribed burning is a best land management practice. The results of individual burns will be monitored and used to develop a long-term prescribed burning plan for Fort Greely.

14-3b(5) Bison Habitat Enhancement

Description. Improve bison habitat in certain areas to reduce conflicts between bison and local farmers or military activities. Improved habitat will support and may increase the bison herd. The *Fort Greely Resource Management Plan* (BLM and U.S. Army, 1994) requires the Habitat Management Plan (included within this INRMP) include an analysis of whether or not bison food plots should be maintained or created. The Sikes Act and AR200-3 mandates management of wildlife habitat.

Methods. Food plots, prescribed burns, and placement of salt blocks have been used on Fort Greely to manipulate bison habitat and their use of the land.

Several management strategies have been proposed to reduce crop damage caused by bison in the Clearwater farming district. Fertilizing bison summer ranges increases plant production and could delay the bison from moving into farming areas until after crops are harvested. A buffer zone with planted pastures and salt blocks established between summer and winter ranges might also delay movement. The Alaska State Legislature passed a bill in 1979 to develop bison grazing lands and study the results. As a result, the ADF&G Bison Range was established.

Conflicts between military training and bison have occurred. These have caused problems with accomplishing the military mission and bison mortality. Kiker and Fielder (1980), Fielder (1980), and Spiers (1981) discuss conflicts involving bison. Conflicts may increase as bison and (possibly) military use increase. Bison use in the Texas Range has increased in recent years. Therefore, an objective of the habitat management plan is to enhance bison habitat outside of the Texas and Washington ranges by renovating food plots and enhancing habitat along the Delta River, in the vicinity of Donnelly Dome.

There is no plan to use habitat management to increase the size of the bison herd on Fort Greely.

Fielder (1980) planned to reroute the migration of the Delta bison herd. Objectives were to move bison away from the Fort Greely cantonment area and Allen Army airfield and to delay the herd's arrival in the Delta-Clearwater farming area until after crop harvest. This plan emphasized planting high-quality grasses along a cleared trail, creating food plots, fertilizing natural vegetation, and placement of salt blocks. The trail was cleared, and a few food plots and salt sites were established. The trail soon was abandoned because maintenance costs were high and bison use was minimal.

Spiers (1981), in coordination with ADF&G, planned to upgrade the bison herd's summer range to delay the herd's northern migration, thus alleviating crop damage in the Delta-Clearwater farming area. The plan included evaluating the effects of a small prescribed burn on the quality of bison habitat and the effects of aerial fertilization of grass. If the results of the small prescribed burn were positive, the plan called for burning about 5,000 acres of wooded land on the western side of the Delta River to increase the size of summer range. Proper conditions for burning never occurred, so the burning project was not completed. Aerial fertilization occurred, and good forage production was noted, but costs were deemed too high.

Burning has mixed results for attracting bison. The 1990 burn has not been used extensively by bison, but other burns have been used intensively. Generally, burning improves bison habitat for one to four years. Prescribed burning is expensive because fire crews must be on standby during burning operations. Also, the knowledge of vegetation response to burning at any site is limited. At this time, no prescribed burning solely for the purpose of improving bison habitat is planned.

The Delta Bison Working Group and ADF&G (ADF&G, 1993) have two objectives for reducing conflicts between bison and the public in the Delta Junction area:

- Manage bison and summer range so at least 75% of the herd remains west of the Richardson

Highway (between Black Rapids Glacier and the Tanana River) until August 20 each year.

- ▶ Keep the bison herd out of the Delta Agricultural Project until October 1 each year.

A recent study by Berger (1996) indicated that prescribed burning or a “let-burn” policy might be effective bison management strategies. Fertilization doubled the forage available during this study, but costs were high. The study also found that bison grazing has no effect on graminoid meadow productivity, but it did increase nitrogen concentration of graminoids.

Food plots can be planted and will attract bison, but they must remain off-limits to military use and are expensive to establish and maintain. Food plot crops should include brome, fescue, or perennial grasses. Fertilization is needed.

The placement of salt blocks can entice bison to an area or delay their movement from an area for several weeks in some cases. Salt block placement, by itself, is not effective.

Grass production on old gravel bars responds well to fertilization. In some cases, herbicides or burning is needed to remove woody vegetation prior to fertilization. Fertilizer should not be used in areas with *Calamagrostis*, an undesired species. In addition, fertilizer should only be used with great care, especially near riparian areas. At this time, fertilization is planned only for rehabilitation of existing food plots.

Bison use of the Texas and Washington ranges, (on the eastern side of the Delta River) for calving has increased in recent years. USARAK will rehabilitate six food plots (2-30 acres each) closest to Texas Range in 1999. These old food plots now contain aspen and other hardwoods, and they are in an area where prescribed burning is difficult to accomplish. The rehabilitation will include bush hogging, followed by disking and fertilization.

14-3b(6) Rights-of-way Habitat Management

Description. Adjust construction and maintenance practices involving rights-of-way on Fort Greely to improve wildlife habitat. Many wildlife species use open areas, such as found on rights-of-way, which often pass through a variety of habitats. Construc-

tion and maintenance of rights-of-way on Fort Greely offer opportunities to enhance wildlife habitat at little additional costs.

Methods. Rights-of-way are generally bladed to bare ground, which causes erosion in many areas and destroys wildlife habitat. If these areas were cleared and maintained with a hydro-axe or feller-buncher, erosion would be minimized, and wildlife habitat would be enhanced for many species. The Natural Resources Branch will coordinate with DPW planners and maintenance personnel to implement these changes during 1998-2002.

14-3b(7) Military Training Habitat Management

Description. Conduct up to 100 acres of military training habitat improvement each year during 1998-2002. Military facilities, such as drop zones, firing points, landing zones, landing strips, and firing ranges require little or no woody vegetation to conduct safe and realistic training. This project will allow maintenance of such areas to enhance habitat. Many wildlife species use open areas. Construction and maintenance of these areas on Fort Greely offer opportunities to enhance wildlife habitat at little additional cost.

Methods. Clearing and maintaining open areas with a hydro-axe or feller-buncher instead of clearing with a dozer blade would minimize erosion and enhance wildlife habitat for many species. Prescribed burning should be conducted after clearing to select for native grasses. The Natural Resources Branch will coordinate with DPW planners and maintenance personnel to implement these changes during 1998-2002.

14-3c Fish and Wildlife Population Management

Project Description. Conduct fish and wildlife population management on Fort Greely during 1998-2002.

Project Justification. The manipulation of populations is an important aspect of fish and wildlife management. The Sikes Act and AR 200-3 require fish and wildlife population management.

Project Prescription. Population management includes working with Alaska Department of Fish and Game to establish game harvest levels, stock fish in

rivers and lakes, control nuisance animals, conduct ruffed grouse reintroduction, and other projects to enhance game and non-game populations.

14-3c(1) Hunting, Trapping, and Fishing Harvest Management

Description. Manage the harvest of game, furbearers, and sport fish. Human use of sustainable resources is a critical aspect of ecosystem management. This includes hunting, trapping, and fishing on Fort Greely. The Sikes Act and AR 200-3 require the management of game, furbearers, and sport fish to ensure sustainability of harvests and protect the species involved.

Methods. Hunting, fishing, and trapping are allowed on Fort Greely under regulations promulgated by ADF&G to ensure available habitat can support population numbers, as well as being able to sustain recreational hunting demand. USARAK manages wildlife populations within these regulations.

USARAK collects post harvest data on game, furbearers, and sport fish and provides this information to ADF&G to assist the agency in promulgating species harvest regulations. USARAK manages hunting, trapping, and fishing on Fort Greely by designating areas available, establishing dates within ADF&G seasons, safety requirements, permit and reporting requirements, and other parameters to avoid conflicts with the military mission while providing safe, high quality recreational experiences (Chapter 17). USARAK collects data on species that are harvested, which is valuable to managing future harvests.

14-3c(2) Fish Stocking

Description. Conduct fish stocking on accessible lakes on Fort Greely. Fish stocking is used to enhance human use (fishing) of sustainable natural resources, consistent with ecosystem management. It is an important aspect of fisheries management in Alaska. Fishing opportunities would be very limited without stocking. Fish stocking directly supports quality of life of the Fort Greely and local communities. According to the ADF&G stocking plan (1998), stocking diverts angling pressure away from fragile native stocks while maintaining angling opportunities.

Methods. Lakes on Fort Greely, primarily in the Meadows Road area, generally are capable of sustaining fish year-round, but seldom does fish spawning occur in these lakes. Most lakes are small, with the exception of Bolio Lake, which is about 150 acres. Unfortunately, Bolio Lake provides marginal habitat conditions for fish during winter. Stocking is critical for maintaining quality fisheries in Fort Greely lakes. About 60% of stocked fish are caught annually.

ADF&G stocks fish on Fort Greely under the State-wide Stocking Plan (ADF&G, 1996). In the past, Fort Greely has provided helicopter support for stocking remote lakes, both on and off the post. Due to BRAC actions, however, there will be no helicopters based on Fort Greely, and stocking support must come from Fort Wainwright. During 1998-2002, the Army will continue to support the stocking of lakes in the Fort Greely area, provided helicopters are available from Fort Wainwright. Table 14-3c(2) outlines the planned stocking of Fort Greely's lakes from 1998-2002, while Figure 14-3c(2) shows lakes that ADF&G stock.

14-3c(3) Wildlife Transplanting and Stocking

USARAK is committed to preserving and enhancing biodiversity. Prior to any introduction of a new species to the post, appropriate NEPA documentation and consultation with partners of this INRMP will be completed. There are no current plans for transplanting wildlife either onto or from Fort Greely.

14-4 Wetland Management

14-4a Create/Update Wetland Management Plan

Project Description. Prepare, update and implement a wetland management plan for Fort Greely.

Project Justification. Implementation of an effective wetland management plan would maintain and enhance the health, productivity, and biological diversity of wetland ecosystems. Management of wetlands is consistent with ecosystem management principles and is required by the Sikes Act, AR 200-3, and Executive Order 11990.

Project Prescription. The wetland management plan will be completed by 2000.

Table 14-3c(2). Planned stocking in Fort Greely lakes during 1998-2002 (ADF&G, 1996).

Location	Species	Size	1998	1999	2000	2001	2002
Koole	Rainbow	Fingerling	16,000	16,000	16,000	16,000	16,000
Bolio	Rainbow	Catchable	1,500	2,500	2,500	2,500	2,500
Mark	Rainbow	Fingerling		3,600		3,600	
Mark	Coho	Fingerling	3,600		3,600		3,600
Weasel	Rainbow	Fingerling	1,600		1,600		1,600
Bullwinkle	Rainbow	Fingerling		800		800	
Chet	Rainbow	Fingerling		1,600		1,600	
Chet	Lake Trout	Fingerling	800		800		800
Ghost	Rainbow	Fingerling		1,000		1,000	
Ghost	Lake Trout	Fingerling	1,000		1,000		1,000
South Twin	Rainbow	Fingerling	4,000	4,000	4,000	4,000	4,000
Rockhound	Rainbow	Fingerling		600		600	
No Mercy	Rainbow	Fingerling		600		600	
Nickel	Rainbow	Fingerling		1,000		1,000	
Nickel	Grayling	Fingerling		250		250	
Nickel	Lake Trout	Fingerling	500		500		500
North Twin	Rainbow	Fingerling	2,000	2,000	2,000	2,000	2,000
North Twin	Lake Trout	Fingerling	2,000		2,000		2,000
Doc Lake	Rainbow	Fingerling		500		500	
Luke	Grayling	Fingerling		400		400	
J	Grayling	Fingerling		750		750	
J	Coho	Fingerling	3,000		3,000		3,000
Sheefish	Grayling	Fingerling		400		400	
Sheefish	Arctic Char	Fingerling		800		800	

14-4b Section 404 Consultation

Project Description. Obtain the permits necessary to stay in compliance with Section 404 of the Clean Water Act and AR 200-3.

Project Justification. During FY 96 two wetlands incidents nearly prompted the Corps of Engineers

to issue USARAK notices of violation. This project will allow USARAK to obtain a 5-year general permit allowing training in low-function wetlands on Fort Wainwright and Fort Greely. USARAK will prepare and obtain individual permits outside of the general permit area. These permits are required under Section 404 of the Clean Water Act and AR 200-3.

Project Prescription. Consult with the U.S. Army Corps of Engineers to obtain permits under Section 404 of the Clean Water Act.

14-4b(1) Obtain Individual Permits for Arctic Strike and Northern Edge

Description. Obtain permits to conduct Arctic Strike and Northern Edge military exercises on Fort Wainwright and Fort Greely. These permits are required under Section 404 of the Clean Water Act and AR 200-3.

Methods. Consult with the U.S. Army Corps of Engineers to obtain permits to conduct Arctic Strike and Northern Edge military exercises on Fort Wainwright and Fort Greely.

14-4b(2) Obtain Five-Year General Permit

Description. Obtain a five-year general permit to allow training in low-function wetlands on Fort Greely. These permits are required under Section 404 of the Clean Water Act and AR 200-3.

Methods. In 1999, USARAK will apply, obtain, and maintain a five-year general permit to allow training in low-function wetlands on Fort Greely. This project is the responsibility of USARAK Natural Resources. The general permit will authorize military exercises in low-function wetlands. Therefore, it will be a USARAK policy to avoid impacting high-function wetlands as much as possible, to avoid obtaining individual permits in the future.

14-4c Wetland Management

Project Description. Manage wetlands on Fort Greely, including revegetation of those damaged by military training.

Project Justification. Wetlands are critical to the protection and maintenance of living resources as they provide essential breeding, spawning, nesting, and wintering habitats for a major portion of Fort Wainwright's fish and wildlife species. Wetlands also protect the quality of surface waters by impeding the erosive forces of moving water and trapping waterborne sediments and pollutants. They protect regional water supplies by assisting in the purification of surface and groundwater resources, and maintaining base flow to surface waters through the

gradual release of stored flood waters. Wetlands also provide a natural means of flood and storm damage protection through the absorption and storage of water during high runoff periods.

Military training is conducted in areas that are classified as low-function wetlands. Under a general permit from the Corps of Engineers, wetland revegetation must take place when disturbed as a result of training. Wetlands are regulated under Section 404 of the Clean Water Act; both the general and individual permits require management and revegetation. Executive Order 11990 and AR200-3 require management of wetlands.

Project Prescription. Section 13-4, *Special Interest Areas*, includes provisions to protect the quality of wetlands at Fort Wainwright. These include using NEPA analysis to identify wetland conflicts with planned actions, and review of projects and activities involving wetlands. Additionally, other sections of this INRMP contain provisions for protecting water quality, which includes wetlands. Provisions are found within *Training Requirements Integration* (13-2b), *Land Rehabilitation and Maintenance* (14-5c), and *Erosion Control* (14-5b).

14-4c(1) Protect Wetland

Project Description. Protect wetland through planning, mapping overlays and coordination. The ongoing wetland delineation project (Section 12-2b) will improve wetland protection by making it easier to determine whether or not wetlands exist in any given location. This delineation will be followed by a classification system based on hydrogeomorphic characteristics of vegetative communities, including a description of values and functions of wetlands, along with management recommendations. All of this data will be used to develop a wetland management plan (Section 14-4a) in 1999.

Methods. NEPA analysis is the primary means to identify threats to wetlands on Fort Greely. NEPA requires that projects be evaluated for possible impacts. In most cases, the Natural Resources Branch makes the initial evaluation. Projects with potential impacts are referred to COE to determine if jurisdictional wetlands are implicated and to establish mitigation procedures.

In 1998-2002, USARAK will take the following measures to protect and manage wetlands on Fort Greely:

- ▶ Review all projects involving wetlands, using the NEPA process
- ▶ Encourage project managers to coordinate early with ERD to determine adverse impacts to wetlands
- ▶ Constrain development and training to avoid wetland impacts to the maximum extent possible and mitigate unavoidable impacts on wetland functions
- ▶ Continue restrictions on the firing of munitions into wetlands
- ▶ Incorporate wetland conservation education into Environmental Awareness programs
- ▶ Review and implement pertinent recommendations from the wetland study

14-4c(2) Mitigate Wetland Damage

Project Description. This project will repair wetland damage from military activities as required under the general and individual permits for training in wetlands. Military training is conducted in areas that are classified as low-function wetlands. Under a general permit from the Corps of Engineers, revegetation must occur when wetland vegetation is disturbed as a result of training. Wetlands are regulated by Section 404 of the Clean Water Act. General and individual permits require management and revegetation.

Project Prescription. Mitigation requirements will be outlined in reclamation plans within the general and individual permits.

14-4c(3) Wetland and Lake Clean-up

Description. Clean-up wetlands and lakes on Fort Greely. Military training is conducted in areas that are classified as low-function wetlands. Under a general permit from the Corps of Engineers, wetland revegetation must take place when wetlands are disturbed as a result of training. Wetlands are regulated under Section 404 of the Clean Water Act, and management and revegetation are requirements of the permits.

Methods. Will occur as part of training area clean-up.

14-5 Land Management

14-5a Erosion Control Management Plan

Project Description. Update and implement an erosion control management plan for Fort Greely.

Project Justification. This plan is required to correct active erosion sites near sensitive areas such as streams and wetlands. This plan is required to stay in compliance with the Clean Water Act and the Sikes Act which requires “no net loss” in the capability to support the military mission of Fort Greely.

Project Prescription. The erosion control plan will contain information on the location, extent, and severity of erosion sites as well as detailed scopes of work necessary to repair the sites. This project will be completed by USARAK in 1999.

14-5b Erosion Control

Project Description. Control erosion on up to 75 acres on Fort Greely. Work is required to correct active erosion sites near sensitive areas such as streams and wetlands.

Project Justification. Erosion control is required by AR 200-3 to correct active erosion sites near sensitive areas such as streams and wetlands. This plan is required to stay in compliance with the Clean Water Act and the Sikes Act, which requires “no net loss” in the capability to support the military mission of Fort Greely. Projects are intended to complement the LRAM component of ITAM, not duplicate training area repair.

Project Prescription. Installation sources of dust, runoff, silt, and erosion debris will be controlled to prevent damage to land, water resources, equipment, and facilities, including those on adjacent properties. A protective vegetative cover will be maintained over all compatible areas. Use of bioengineered erosion control practices will be used when possible. Live plantings, root wads, coir logs, and spruce tree revetments provide erosion protection and habitat for fish and wildlife. Other materials that may be

used for erosion control include gravel, fabrics, mulch, riprap, and recycled concrete and pavement that are environmentally safe and compatible with the site. When bare ground is required to accomplish mission objectives, other soil conservation measures will be used to control dust, erosion, and sedimentation. Physically intensive, land-disturbing activities should be sited on the least erodable lands to minimize land maintenance expenditures and help ensure environmental compliance. The potential erodability of sites and locations of adjacent wetlands will be identified and analyzed in all prepared plans for development, training, and other land uses.

Erosion control is included within the LRAM section (Section 14-5c) to the degree that it is associated with the maintenance and rehabilitation of training lands. However, erosion control is also associated with water pollution (environmental compliance) and road maintenance.

Most erosion control not associated with LRAM on Fort Wainwright involves road drainage correction or maintenance. Road drainage maintenance is important for controlling sedimentation. Road maintenance on training lands is generally a responsibility of DPW. However, the 47th Combat Engineers also provide considerable road maintenance. In addition, the USAF maintains roads due to its need for access to its equipment.

When roads are repaired, drainage problems should be corrected. However, range road maintenance at Fort Wainwright, like many other Army posts, has a backlog due to budget cutbacks and higher priorities within the cantonment area. Thus, road drainage is often inadequate for proper distribution of runoff. Roads can be damaged in a short period of time, especially during spring breakup. Therefore, it is difficult to establish long-range priorities for correcting road erosion.

14-5c Land Rehabilitation and Maintenance

Project Description. Implement the Land Rehabilitation and Maintenance (LRAM) program, a component of ITAM, to maintain quality military training lands and minimize long-term costs associated with land rehabilitation.

Project Justification. LRAM is necessary to maintain a realistic training environment for soldiers and to comply with the Sikes Act requirement for “no net loss” in the capability of Fort Greely to support its military mission.

Project Prescription. LRAM involves repair of damaged lands and use of land construction technology to avoid future damage to training lands. LRAM uses technologies, such as revegetation and erosion control techniques, to maintain soils and vegetation required for accomplishment of the military mission. LRAM includes programming, planning, designing, and executing land rehabilitation, maintenance, and reconfiguration projects based on requirements and priorities identified in the TRI component of ITAM (see Section 13-2b).

14-5c(1) Land Rehabilitation and Maintenance Management Plan

Description. Develop a five-year LRAM management plan. Benefits to training include identification, delineation, and scoping of LRAM projects to be implemented during 1998 through 2002.

Methods. USARAK will cooperate/contract with ADNR Plant Materials Center to develop and write the plan in 1999.

14-5c(2) OP Training Area

Description. Repair maneuver damage and other military disturbance in the OP Training Area. Benefits to training include a more realistic training resource, decrease in safety concerns, and fewer animal conflicts due to trash.

Methods. Fill trenches and fox holes, and remove trash. Clean-up is scheduled for 1999.

14-5c(3) Bolio North Training Area

Description. Repair maneuver damage and other military disturbance in Bolio North Training Area. Benefits to training include a more realistic training resource, decrease in safety concerns, and fewer animal conflicts due to trash.

Methods. Project to be contracted through ADNR, PMC. The contractor will repair maneuver damage, fill trenches and fox holes, and remove trash. Project scheduled for 1999.

14-5c(4) OBER Training Area

Description. Repair maneuver damage and other military disturbance in OBER Training Area. Benefits to training include a more realistic training resource, decrease in safety concerns, and fewer animal conflicts due to trash.

Methods. Project to be contracted through ADNR, PMC. The contractor will repair maneuver damage, fill trenches and fox holes, and remove trash. Project scheduled for 2000.

14-5c(5) Donnelly Training Area

Description. Repair maneuver damage and other military disturbance in Donnelly Training Area. Benefits to training include a more realistic training resource, decrease in safety concerns, and fewer animal conflicts due to trash.

Methods. Project to be contracted through ADNR, PMC. The contractor will repair maneuver damage, fill trenches and fox holes, and remove trash. Project scheduled for 2000.

14-5c(6) Jarvis North Training Area

Description. Repair maneuver damage and other military disturbance in Jarvis North Training Area. Benefits to training include a more realistic training resource, decrease in safety concerns, and fewer animal conflicts due to trash.

Methods. Project to be contracted through ADNR, PMC. The contractor will repair maneuver damage, fill trenches and fox holes, and remove trash. Project scheduled for 2001.

14-5c(7) Jarvis East Training Area

Description. Repair maneuver damage and other military disturbance in Jarvis East Training Area. Benefits to training include a more realistic training resource, decrease in safety concerns, and fewer animal conflicts due to trash.

Methods. Project to be contracted through ADNR, PMC. The contractor will repair maneuver damage, fill trenches and fox holes, and remove trash. Project scheduled for 2001.

14-5c(8) Butch Training Area

Description. Repair maneuver damage and other military disturbance in Butch Training Area. Benefits to training include a more realistic training resource, decrease in safety concerns, and fewer animal conflicts due to trash.

Methods. Project to be contracted through ADNR, PMC. The contractor will repair maneuver damage, fill trenches and fox holes, and remove trash. Project scheduled for 2002.

14-5c(9) Granite North Training Area

Description. Repair maneuver damage and other military disturbance in Granite North Training Area. Benefits to training include a more realistic training resource, decrease in safety concerns, and fewer animal conflicts due to trash.

Methods. Project to be contracted through ADNR, PMC. The contractor will repair maneuver damage, fill trenches and fox holes, and remove trash. Project scheduled for 2002.

14-5c(10) Training Area Debris Clean-up

Description. Remove debris from training areas as part of Training Area Spring Clean-up. Areas within or near the cantonment area are used for training, and debris has been left in the field. These are unsightly, detract from the quality of life, and in some cases, pose safety hazards.

Methods. The Command will emphasize this project for the 1999 Post Spring Clean-up. Debris to be removed includes trip wire, barbed wire, barrels, etc. Natural resources personnel will provide a list of locations and typical debris to Range Control for coordination of this soldier project.

14-6 Improved Grounds Management

This section includes management of the cantonment area that directly affects natural resources management. Routine ground maintenance on Fort Greely is accomplished primarily by Grounds Main-

tenance, DPW. The *Installation Design Guide* (Higginbotham/Briggs & Associates, 1991) and the *Landscape Design Plan* (David Evans and Associates, Inc., 1987) provide information on using trees and shrubs for landscaping. Both documents provide lists of plant materials appropriate for use on Fort Wainwright.

This INRMP does not include routine ground maintenance unless it is specifically designed for the benefit of natural resources. Natural resources personnel provide professional assistance for landscaping, particularly regarding species selection and care of the landscape. In 1996, the ERD produced a *Landscape and Planting Guide* (Fort Wainwright, 1996).

Routine ground maintenance on Fort Greely is the responsibility of Roads and Grounds Maintenance, DPW. The BRAC process, however, will greatly reduce ground maintenance on Fort Greely.

The *Installation Design Guide* (Higginbotham/Briggs & Associates, 1991) and the *Landscape Design Plan* (David Evans and Associates, Inc., 1987) provide information on trees and shrubs for landscaping. Both documents list plant materials appropriate for use on Fort Greely. There is no need for additional landscaping beyond what already exists.

14-7 Pest Management

Pest management is the responsibility of DPW, specifically a Certified Pest Controller. Other organizations involved include PMO game wardens and DPW Environmental Resources. The Pest Management Coordinator for USARAK is within Natural Resources Branch, DPW, Fort Richardson. He is not involved in routine pest management operations, but serves as a technical advisor to the program.

14-7a Measures of Merit

Project Description. Meet requirements defined by the Army pest management program measures of merit.

Project Justification. In 1994 the Army approved three measures of merit for USARPAC installations that effectively defined the course of Pest Management programs.

Project Prescription. These measures are to have a current pest management plan by the end of FY 97, to reduce pesticide use by 50% over a seven year period (1994-2000), and to have pesticide applicators certified within two years of employment by end of FY 98. As described below, USARAK will work to meet or maintain compliance with these measures of merit during 1998-2002.

14-7a(1) Integrated Pest Management Plan

Description. Maintain and update the Integrated Pest Management Plan. Completion and updates of the plan are required to meet USARPAC pest management measures of merit.

Methods. Fort Greely updated its Integrated Pest Management Plan (IPMP) in 1996. The goal of the IPMP is to minimize the adverse environmental impacts of using pesticides while achieving an acceptable level of control and cost-effectiveness. Measures for achieving these goals are listed below.

- ▶ Use alternative strategies (sanitation, trapping, biological control, mechanical control, etc.)
- ▶ Select the least toxic pesticides
- ▶ Select precision application techniques that target specific pests and habitats
- ▶ Emphasize education, communication, monitoring, inspection, and record keeping

14-7a(2) Reduced Chemical Use

Description. Reduce pesticide use after adequate pest and vegetation control is achieved, probably after 1998. Reductions in use of pesticides are required to meet USARPAC pest management measures of merit.

Methods. All chemicals used on Fort Greely are Environmental Protection Agency (EPA) approved. Use of pesticides on Fort Greely has decreased significantly in recent years, mostly due to reductions of 2-4D, the most commonly used herbicide.

Reducing chemical use is a major goal of the Pest Management program. Installation personnel understand both immediate and long-term threats to humans and ecosystem functions from chemical abuses. The Pest Management program emphasizes careful evaluation before chemicals are applied.

More efficient equipment and techniques allow the reductions in the volumes and toxicity of chemicals used.

14-7a(3) Applicator Certification

Description. Provide refresher training for Pest Control personnel certified for pesticide handling. Certification and maintenance of that certification for Pest Control personnel at Fort Greely are required to meet USARPAC pest management measures of merit.

Methods. The Fort Greely Pest Controller is due for recertification. This will be accomplished prior to FY 99 to comply with the measures of merit. The USARAK has the option to use a combined Army, Navy, and Air Force pesticide training facility in Hawaii or the Army school at Fort Sam Houston in Texas.

14-7b Noxious Plant Control

Project Description. Control noxious plants within the cantonment area.

Project Justification. Dandelions (*Taraxacum sp.*) are a major weed problem on Fort Greely, especially in the past few years due to cutbacks in noxious weed control. There is a significant backlog in woody plant control, especially on rights-of-way.

Project Prescription. At Fort Greely, vegetation control is required on the airfield, shoulders of main roads, storage areas, and in pavement cracks. Weeds such as dandelions, knotweed, crabgrass, etc. are treated when requested on a service or work order (Lassek, 1996). Chemical control is a last-resort option. Lawn weeds are treated with 2-4D; Roundup® is used on weeds growing in pavement cracks.

Soil sterilants are used in areas where bare ground is required, such as the industrial portion of the post and the POL (Petroleum, Oil, and Lubricants) point. Bromacil® is used for this purpose.

Any plant control activities associated with withdrawn lands will consider the BLM strategic noxious weed control plan.

14-7c Pest Animal Control

Project Description. Control pest animals on Fort Greely.

Project Justification. Below are brief descriptions of pest animal issues on Fort Greely:

- ▶ Generally, stray pets are a minor problem at Fort Greely.
- ▶ Common household and nuisance pests include German and smokey brown cockroaches (the most common pests on the post), silverfish, spiders, fleas, beetles, hornets, wasps, and other occasional intruders.
- ▶ Road-killed moose must be removed as soon as possible, especially if they are in the cantonment area.
- ▶ Cliff swallows are a problem within the cantonment area. Swallows often build their nests under eaves of buildings, including residences. This creates a nuisance and health concern. Droppings are unsightly and are a growth medium for a fungi that causes respiratory infection (histoplasmosis). Swallows can also be infested with mites.
- ▶ Another bird problem is pigeons in aircraft hangers. Pigeons roost above parked aircraft and their droppings create maintenance and human health problems.
- ▶ Scale insects, aphids, and other pests of trees and ornamentals are significant on Fort Greely only during significant population outbreaks of these pests.
- ▶ Real property pests include carpenter ants and decay fungi, neither of which has been a major concern at Fort Greely.
- ▶ Mosquitoes, biting gnats, and flies are pests during warm months.

There are occasional other pest animal problems on Fort Greely. Pests must be controlled for a variety of reasons, including human health, protection of property and foodstuffs, protection of desired vegetation, safety, and general quality of life.

Project Prescription. Noxious animal control responsibility is shared at Fort Greely. In general, Pest Control Branch, DPW, and the Provost Marshal work within the cantonment area. The Provost Mar-

shal, assisted by ADF&G and the Alaska State Troopers, handles problems with game animals. Animal Damage Control (ADC), U.S. Department of Agriculture, has skills that may be useful in controlling noxious animals during 1998-2002. USARAK will use ADC on a reimbursable basis as required during the next five years.

Domestic Pets. Stray cats and dogs generally are the responsibility of road patrol personnel of the Provost Marshal. Neither road units nor game wardens with the Military Police have access to tranquilizer guns, so slip nooses are generally used to capture animals. Captured animals are taken to the Fort Greely veterinarian.

Household and Nuisance Pests. Pest Control handles household pests on Fort Greely. An integrated approach is used to control pests, including education, sanitation, and as a last resort, chemical control. Rodents, such as shrews, voles, and lemmings are controlled by using sticky traps or bait (Lassek, 1996).

Undesirable Fish. A few Fort Greely lakes, such as J Lake, have excessive biomass of undesirable fish, principally northern longnose suckers. They affect the growth and survival of game species. Fort Greely and ADF&G personnel will cooperatively use Rotenone to remove most of this biomass and restock these lakes with game fish. Because undesirable species can move back into these lakes during periods of high water, gambian dams will be constructed. Gambian dams are large rock structures that allow water, but not fish, to flow through.

Road-killed Moose. Military Police game wardens are called to handle road-killed moose. If carcasses are still safe for human consumption, they are donated, using a charity list.

Birds (except BASH). Cliff swallows may build nests under eaves of buildings, including residences, creating a nuisance and health concern. Droppings are unsightly and are a growth medium for a fungi that causes a respiratory infection (histoplasmosis). Swallows also are infested with mites.

Exclusion from nesting sites is the preferred means for controlling cliff swallows. Sometimes it is necessary to destroy nests, which may include eggs or young. Fort Greely personnel will ensure that such

nest destruction is conducted only under a permit from USFWS. Detection and action early in the breeding season will avoid destruction of nests with young or eggs. The Fire Department is sometimes called upon to wash out nests in places difficult to reach such as in the aircraft hangar. Swallow problems have significantly decreased in recent years.

There are numerous ways to deal with pigeon problems, depending on location. Each case is evaluated individually and appropriate action is taken. In general, screening is the preferred method to keep pigeons from hangers. However, in 1995 it was necessary to trap pigeons with 287 being captured.

Ornamental and Tree Pests. Scale insects, aphids, and other pests of trees and ornamentals are seldom a problem on Fort Greely. Use of insect-resistant trees and ornamentals, and proper care of trees, including watering, pruning, and fertilization, minimize outbreaks (Lassek, 1996).

Real Property and Stored Product Pests. Real property pests include carpenter ants and decay fungi. Neither is a major concern at Fort Greely. Control is conducted on an as-needed basis. Veterinary personnel at MEDDAC inspect for pests in stored products except in Housing which is the Pest Controller's responsibility. The two most common pests of stored products are the sawtooth grain beetle (*Oryzaephilus surinamensis*) and the confused flour beetle (*Tribolium confusum*). Infestations are controlled by DPW, generally through destruction of the product, followed by application of a residual insecticide (Lassek, 1996).

Disease Vectors. Mosquitoes, biting gnats, and flies are serious pests during warm months. The Alaska Preventative Medicine Branch, MEDDAC and the Pest Controller are responsible for monitoring mosquitoes and determining if they need to be controlled. Control is the responsibility of DPW and includes elimination of mosquito breeding areas and use of pesticides when needed. Ultra low volume insecticide treatment of *Pyrenone* is recommended. Flies normally are treated using sanitation practices.

Predator Control. A special provision has been established that prohibits the control of wolf populations on military lands in Alaska¹². USARAK has no intention of permitting wolf control on its lands

¹²Administrative Code Supplement, Article 5. Predator Control. 5 AAC 92.110. Control of Predation by Wolves.

during 1998-2002. Any predator control on Fort Greely must be approved by USARAK and evaluated through the NEPA process.

Other Animals. Pest Control handles most other animal problems. Each problem is evaluated individually. Bear problems usually require assistance from ADF&G, although MP game wardens have first-response responsibility. Wardens occasionally chase moose from housing areas.

14-7d Bird-Aircraft Strike Hazard Management

Project Description. Conduct BASH program on Fort Greely.

Project Justification. On September 22, 1995, Alaska discovered the hazards of birds in areas used by aircraft. An Elmendorf AFB AWACS radar surveillance jet crashed with the loss of all aboard. Geese were identified as the cause of the crash. This crash added a sense of urgency to ongoing efforts to develop a BASH program for Allen Army Airfield. The Allen Army Airfield runway is in a flyway for Canada geese, and bird hazards exist. Managing bird populations is required by the Sikes Act and AR 200-3, and will improve safety.

Project Prescription. The BASH program will develop ways of reducing the air strike hazard by manipulating habitat to decrease the number of birds near the runway. The role of the Natural Resources Branch is to provide technical expertise and make recommendations to Public Works, USARAK Aviation Safety, Airfield Operations, and the Pest Control Branch to reduce bird use of critical areas. The BASH program will include the following features:

- ▶ Continue depredation of key nuisance species. The Pest Management program will repair or place wire on hangers where swallows and pigeons are roosting or nesting.
- ▶ Work with all area airfield managers to establish like-minded BASH programs. The Air Force will be using Fort Wainwright and Fort Greely airfields, beginning in FY 2000. This will require coordination to ensure Army airfields meet Air Force BASH standards.

- ▶ Produce education materials for BASH, including videos, posters, handouts, training, bird books, binoculars, etc.
- ▶ Purchase equipment used to keep birds off the airfield.
- ▶ Attend BASH training workshops and other similar opportunities.
- ▶ Coordinating the BASH program is a three Post responsibility.
- ▶ Attend Post BASH team meetings: Fort Wainwright and Fort Greely each have their own BASH team, which try to meet at least once in the spring and fall. A BASH team needs to be developed for Fort Richardson.
- ▶ Oversee BASH programs for all three Posts (hazing, data collection, and analyzing the results after the BASH season is over)
- ▶ Ensure that Public Works, the fire department, and AFS all work together to keep birds off the airfields.
- ▶ Oversee the depredation program, particularly for swallows at Fort Greely.
- ▶ Accompany Fort Greely Airfield Ops at least once a week on their hazing patrols.
- ▶ Attend BASH meetings at Eielson Air Force Base and stay informed of BASH programs at nearby airfields.

14-8 Spatial Information Management

The Geographic Information System (GIS) is a computerized system for the collection, storage, manipulation, and output of spatially referenced information. Fort Wainwright's natural resources and military use spatial data is managed within the USARAK GIS system located at Fort Richardson. This system is a network of digital databases that supports administrative and management objectives affecting all aspects of USARAK controlled lands. The GIS laboratory provides customers with hardcopy maps, statistical information, software support, training and custom software interfaces that com-

plete pre-defined tasks and allows access to on-line digital databases for display and query purposes.

The USARAK GIS system consists of three SUN workstations (Ultra 1, Ultra 2, and Sparc 2) running Solaris version 2.5.1 for desktops. Total hard drive storage is approximately 4 gigabytes with each workstation having 64 megabytes of RAM. Of the Ultra workstations only the Ultra 1 came equipped with an internal 3.5" floppy and CDROM drives. For data exchange and backup purposes, an external 8mm-tape drive resides on the Ultra 2. Attached to the Ultra 1, for data input, is an Altek 36" X 48" digitizing board for data input. A HP650C 36" color plotter is available to all networked computers for map production.

The primary GIS software is Earth Systems Research Institute (ESRI) ArcInfo 7.1 and ArcView 3.1; both are vector-based systems that can incorporate raster functionality. Currently, USARAK has one licensed copy of ArcInfo resident on the system. To access ArcView or multiple copies of ArcInfo, CEMML licenses are accessed via the network. ERDAS Imagine 8.3, a raster based GIS software, is also available on the USARAK system.

14-8a Upgrade GIS System

Description: The GIS system upgrade will consist of several hardware and software improvements, as well as a plan to expand the system in the future. The most urgent need is to increase hard disk storage and the amount of RAM on the Ultra workstations. An additional workstation is also required to serve as a desktop unit for one of the GIS operators. To facilitate data exchange between USARAK and other government and civilian organizations, a CDROM writer is essential. Additional copies of ArcInfo, ArcView, and a server version of Solaris are also necessary to eliminate downtime resulting from an interruption in network connectivity with CSU.

Justification: The current hard drive storage capacity is easily depleted by raster-based modeling and vector storage. Without the additional hard drive space, the GIS lab will be unable to acquire and process additional ortho-rectified images, digital raster layers, or vector data. The USARAK GIS server (Ultra 2) currently experiences memory performance problems associated with a lack of RAM.

Without an increase in RAM the system will not support additional users, creating an ineffective and inefficient server. In addition, another workstation is required to free-up resources on the Ultra 2 so it can function exclusively as the data, print and Intranet server. A CDROM writer is necessary to provide other organizations with requested data. Most computers come equipped with a CDROM making it more efficient to supply requested data on this medium. Access to CEMML software licenses is tenuous due to frequent interruptions in network connectivity. Consequently, purchase of GIS software to be resident on the local system is necessary to prevent GIS operator down time. The upgrade from a desktop version of Solaris to a server version will allow for improved management of computer resources.

14-8a(1) Upgrade Hardware

Purchase 36 gigabytes of hard disk storage. Purchase additional RAM for a minimum total of 256 megabytes for the Ultra 2 workstation. Purchase new Sun Ultra30 workstation. Purchase CDROM writer.

14-8a(2) Upgrade Software

Purchase a three-user license of ArcInfo and ArcView. Purchase a server version of Solaris to replace current desktop version.

14-8a(3) Develop Plan to Conduct Future Expansion

Currently, the ability to access the USARAK GIS system is limited only to Fort Richardson natural resources personnel. Once the GIS database server is operational, access to all interested parties throughout USARAK, via network, will be available. Once this connection is established, data transfer between Fort Wainwright and Fort Richardson will be seamless. To facilitate this, the Sparc 2 will be transferred to Fort Wainwright. The Sparc 2 will have ArcInfo installed, allowing personnel to create and edit coverages on the installation while working directly with the database at Fort Richardson.

Where once GIS software was cumbersome and only able to operate on a UNIX workstation, today's software is portable and easy to use on a desktop PC. Once various organizations within USARAK be-

come aware of the information residing on the database and its possibilities, they will desire access. Consequently, one area for future expansion includes the ability to train and offer software support to potential GIS software users. Ultimately the goal would be to package a training course along with necessary hardware upgrades and software purchases to bring data and output capabilities to the user's desktop.

14-8b Develop GIS Database

Description: Natural resource digital data is stored within the USARAK GIS located at Fort Richardson. Currently, GIS database development is in progress for all USARAK installations. Appendix 14-8b lists completed digital data layers for Fort Greely. Databases scheduled for completion or acquisition in 1998-2002 are digital orthophotos, remote imagery, master planning data conversion, statewide digital data acquisition, city/boroughs digital data acquisition, and conversion of existing data to Tri-Service Standards.

Justification: Currently, the USARAK GIS spatial data is confined within Fort Greely boundaries exclusive of the cantonment. To become a regional GIS center, data needs to be acquired statewide to meet the demand for products outside USARAK boundaries. Master planning data including all buildings and facilities within the cantonment area are stored on a different platform and under a different projection. Therefore, the data is inaccessible, resulting in the inability to generate output of the cantonment area. To rectify the situation, the data needs to be converted to an ESRI compatible format and reprojected to the Universal Transverse Mercator System (UTM). Tri-Service Standards were developed for use as a standard for GIS implementations throughout DOD. USARAK data currently does not conform to these standards and must be transformed to comply with them.

14-8b(1) Obtain Digital Orthophotos

Description: Digital orthophotos are softcopy photography that has been corrected for photo scale variation, geometric distortion and image displacement resulting from relief and tilt. Currently, Fort Wainwright does not possess digital imagery. For natural resources purposes, color infrared photog-

raphy is preferable for delineation of water, vegetation, and artificial features. This photography must also possess a high spatial resolution (less than or equal to 1 meter) so small features can be distinguished.

14-8b(2) Obtain Remote Imagery

Description: Satellite images are a complementary interpretive tool to low altitude aerial photographs. For instance, large features extending many kilometers might be evident from a satellite image but escape notice on low altitude photographs. In addition, a single Landsat image would encompass approximately 1600 1:20000 photographs.

Satellite Probatoire d'Observation de la Terre (SPOT) is a French government satellite program that has off-nadir viewing capabilities and affords full-scene stereoscopic imaging from two different satellites. This data can be acquired in two modes of sensing: a 10-m-resolution "panchromatic" (black and white) or a 20-m-resolution multispectral (color infrared) mode. The use of SPOT data for natural resource interpretive purposes is desirable due to the excellent spatial resolution and multispectral sensing capabilities.

14-8b(3) Convert Master Planning Data

Description: Currently, all master planning data that includes building locations and dimensions, roads, power lines, and other planimetric features are stored in a CAD program using a local map projection. Prior to use with existing GIS data, the master planning information has to be converted for use with ESRI software in a UTM projection. Without the conversion, USARAK GIS is unable to assess the data and is impotent when requested to produce a map or supply the customer with needed output.

14-8b(4) Acquire Statewide (Including City Borough) Digital Data

Description: Often information outside Fort Greely boundaries is requested. These include area maps of adjacent lands, landforms, vegetation composition off post, and census information for the surrounding communities. Much of this information has already been developed by various government and private organizations and is available for a charge.

14-8b(5) Convert Existing Data to Tri-Service Standards

Description: Tri-Service Spatial Data Standards (TSSDS) were developed for use as a basis for GIS implementations at Air Force, Army, and Navy Installations. The Spatial Data Standards were designed to complement Federal Geographic Data Committee (FGDC) data standards that address small scale mapping with graphic and attribute data standards for entities depicted in large scale mapping. It was developed with the intention that it must be compatible with the predominant commercially available CADD, GIS, and relational database software used by DOD organizations. TSSDS has become the standard for GIS implementations throughout the DOD and in other federal, state, and local government organizations.

14-8c GIS Projects

Description: USARAK will complete the following projects for Fort Wainwright: forest cover types, noise contours, Installation Training Capacity (ITC) maps, general wetland permit mapset, GPS and map ranges, update terrain analysis maps, gazetteer, update fire management zones, and USAF Military Operations Areas (MOA) map.

Justification: The Fort Greely spatial database is incomplete and outdated. This information can often be mission critical for military trainers planning exercises or natural resource personnel proposing management actions. Military trainers are required to adhere to strict environmental regulations prescribed by other federal agencies. It is essential that personnel be informed of off limit areas, areas of sensitivity, and restricted training areas. Through GIS, spatial data is presented to the trainer as a map depicting land conditions and restrictions placed on the training land, permitting troops to train to standard. Often the land manager is placed under these same constraints and requires the information to comply with federal and state regulations. In addition, natural resources personnel can use GIS to predict future actions based on current environmental conditions. Finally, this information is essential to track environmental trends on Fort Wainwright. If the information is available, comparisons can be made to quantify enhancements or degradation of the land based on management decisions.

14-8c(1) Forest Cover Types

Description: This data layer will consist of polygon information with specie composition, density, vertical distribution, size distribution, mortality, regeneration, and percent cover. This information can be derived most accurately from intensive field surveys associated with forest inventory. Vegetative cover is often an important factor when planning training missions or natural resource actions. Bivouac locations, zones of engagement, and concealment are often selected based on various vegetative characteristics. In natural resources management, the same information is used to determine timber stand and wildlife habitat improvement. This information in conjunction with other data can create additional GIS data layers such as land use, wetland distribution, and military trafficability.

14-8c(2) Noise Contours

Description: Noise information is an important tool for military planners and is required by Incompatible Use Zones (ICUZ) program. Once developed, the noise contours will be used to assist military and design personnel when siting new weapon systems based on noise levels generated by weapon discharge. This information is also important when determining maximum size of an explosive device discharged in an impact area.

14-8c(3) ITC Maps for ITAM

Description: ITC maps are a standardized set of information requested through DA to spatially depict the capacity of each installation to support maneuver training.

14-8c(4) General Wetland Permit Mapset

Description: This mapset will be used to obtain a general wetland permit for Fort Greely. Due to the difficulties encountered in wetland delineation and enforcement actions, a programmatic wetlands permit is desired to set aside non-critical wetlands and to pre-plan minimal military disturbance on these lands.

14-8c(5) GPS and Map Ranges

Description: To enhance the training mission, a data layer depicting range limits, facilities, and target locations will be obtained. This data will be gathered

by using GPS technology acquiring the location of each feature with an accuracy of one meter. Following data acquisition, maps will be produced and distributed to military trainers.

14-8c(6) Update Terrain Analysis Maps

Description: Terrain analysis maps are the basic spatial data required for the development of Intelligence Preparation for Battlefield (IPB) operations. Map information includes relief and drainage, vegetation, surface materials, manmade features, and land evaluation. Corrected information has been acquired since it was first developed and distributed; an updated map set will be produced.

14-8c(7) Create Gazetteer for Military Maps

Description: The Gazetteer is a book comprised of photomaps for the entire post. These maps with consist of a scalable low level aerial photograph overlaid with georeferenced information found on DMA special maps. The objective of this book is to assist

trainers in mission planning and navigation by depicting planimetric and natural resource features on a high-resolution aerial photograph.

14-8c(8) Update Fire Management Units

Description: This project has been completed by AFS as of September 1998.

14-8c(9) MOA's

Description: The USAF adopted an airspace arrangement with a coalition of partners within the state to ensure its continued training mission, maximum access for civilian aircraft, and minimal impacts to the environment. MOAs include a multitude of fly-over areas above federal, state, and private lands that specify minimum and maximum altitudes. Products derived from the information will be a 3-D representation of the MOAs overlaying a topographic model of the affected areas to assist USAF operation personnel.